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**WMG Service Systems Research Group
Working Paper Series**

**The Role of Marketing in the Design and
Innovation of Future Products in the
Connected Digital Economy**

**Irene CL Ng
Susan YL Wakenshaw**

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The Role of Marketing in the Design and Innovation of Future Products in the Connected Digital Economy

By Irene CL Ng and Susan YL Wakenshaw

Abstract

Technological advances could potentially enable the firm to serve contexts, i.e., achieving value-in-use with customers in their consumption contexts through the provision of offerings. Serving contexts must necessarily shift the role of marketing to the design aspects of products to meet customer needs and also to the production aspects of transactions and transaction boundaries to meet company needs for profitability. This paper proposes a research agenda for the role of marketing in product design and innovation for future products to tackle the constant tension between these two aspects. We propose that the role of marketing would lie in (1) gaining insights into contexts, (2) understanding products as affordance and potential for the dynamic re-configurability, (3) the design of transactions and transaction boundaries, and (4) distributing competencies. The significance of studying the role of marketing in product design and innovation attributes to its potential contribution to develop new business models, and generate opportunities for new offerings and new markets, be they tangible goods or services.

Keywords: Design and innovation; marketing; affordance; value/values; contexts; incomplete product; digital economy

Meeting consumer needs profitably through the provision of offerings has been the promise made by marketing for decades. However, even if the intent is to meet consumer needs, we view the scope of marketing historically as leaning towards representing the firm's offering to consumers for market share and sales. Despite relationship marketing making the case for an enduring relationship with consumers by emphasising post-exchange interactions, the work in relationship marketing is essentially to justify more sustainable markets and sales (e.g., Day 2000). We suggest that this is because marketing is rooted in an exchange economy (Pels 1999), where selling and buying takes a primary role. In such an economy, marketing has focused primarily on identifying consumers' expressed needs; assuming the form of a product that fulfils that need; assisting in sourcing, filtering, evaluating and testing new product ideas and collecting consumer feedback for product improvement to obtain the desired responses from the targeted markets; pushing the products to the markets by enhancing consumer acceptance and increasing the diffusion of new products through affecting consumer choice and buying behaviour.

Vargo and Lusch (2004) consider such a focus as manifestation of a Goods-Dominant (GD) logic, where value is regarded as exchange value and is created when an offering is exchanged, usually for money, between a provider and a consumer. This logic implies that the firm's role in the creation of exchange value often ends upon the transfer of ownership of the 'exchangeable' unit produced by firms. Firms within this logic usually deem their responsibility to be producing products with exchange value and selling them to a targeted market. However, product utilisation and consumption experience, usually less visible to the firm that manufactured it and often in a location away from the firm, is often of secondary importance.

Notwithstanding the majority of marketing literature's implicit focus on exchanges, there have been other works, most notably in consumer research, where the emphasis is on the consumer's consumption experiences. For example, in Holbrook's view, consumers actively participate in creating values from consumption experiences and evaluating the value of offerings based on their actual use (Holbrook 1999). From a Service-Dominant (S-D) logic perspective, the firm's offering is merely a value proposition for the consumer to realise at the point of use. Until the point of value realisation, an offering is only potentially valuable (Vargo and Lusch, 2004).

There is clearly a difference between the firm's understanding of value (money for offering) and the consumer's understanding of value (use and experience of the offering). In an exchange economy, this difference could be largely ignored since it's not possible for the consumer to use or experience an offering unless they own or possess it and to do so, they would need to buy or lease it. Buying and consumption are separate in time and space. Thus, while value to the customer is different from the value to the firm, they could be aligned.

However, with the advent of the connected digital economy, the time and space between purchase and consumption have collapsed for some products. Music is a case in point, since it can be fully digitised. Buying and consuming music can now occur in the same space, in consumer contexts, often through devices such as the phone, since connectivity provides the link to sales and delivery platforms. Thus it can be suggested that technology advances could potentially enable firms to serve contexts, i.e. achieving value-in-use with customers in their consumption contexts through the provision of offerings. We need to rethink how future products could be (re)-designed to serve consumer contexts.

In all of the literature mentioned earlier, products are assumed to be 'fixed'; in other words what products afford or function as, is deemed to be static. Within an increasingly connected digital economy however, products are increasingly designed to be changeable, e.g., through an application interface that allows customisability upon use and reaction to emergent contextual situations. One example is the 'smart phone', which is an 'incomplete' product upon purchase because consumers need to install applications to make it fully functional. For consumers, this incompleteness remains over the product's whole life-cycle so that it could be re-personalised over

and over again for different use contexts (Yoo, Boland and Lyytinen 2012). Technological development enables organisations to provide modular products as dynamic and managed platforms, which then allow consumers to use their creativity and better tailor value-in-use in their contexts, and also enable organisations to channel consumers' activities and practices in their preferred way (Cova and Cova 2012). This implies new forms of innovation, which is increasingly challenging the traditional exchange-oriented approach since products may be potentially and increasingly (re)configured dynamically in use environments to serve contexts. Serving contexts must necessarily shift the role of marketing to the design aspects of products to meet consumer needs and also to the design of transaction boundaries i.e. how, where and when is the firm compensated for the offering, to meet company needs for profitability. Yet, there is constant tension between these two objectives since the scaling of production and cost efficiencies (for profitability) usually require a standardised product, while meeting customer needs (serving contexts) often require greater personalisation and variety. We suggest that firms could possibly achieve modularisation of tasks for scalability (for both firms and customers); create the 'thin crossing points' (for low transaction costs) with 'flexible' and 'reprogrammable' transaction boundaries (for variety); and provide personalised offerings that are completed by the customer in their contexts (for value-in-use and outcomes).

Centred on value/values, this paper proposes a research agenda for the role of marketing in product design and innovation for future incomplete products to serve consumer contexts in the connected digital economy. This paper is structured as follows: first, we review the literature on value and values; then we consider the role of marketing in product design and innovation when value is viewed as value-in-exchange. We then discuss and propose a research agenda for the role of marketing in product design and innovation for achieving value-in-use and for serving contexts profitably.

Value

Historically, value of objects is focused primarily on value analysis, rooted in 'axiology', the naturalistic approach to value in philosophy (Bengtsson 2004). From this approach, value could be mainly reduced to three dimensions: valuable natural properties of objects; human agents 'assigning value' to these properties; and 'goodness', defined in evaluative terms, which all depend on the motivational justification (Bengtsson 2004). The axiological approach to value has affected the understanding of value of offerings in marketing. For example, value has often been described as: the utility (property) added to goods through manufacturing; characteristics of goods; and properties and functions added to goods through marketing institutions and marketers (Vargo and Lusch 2004, p.3). These understandings regard value as 'properties' or 'characteristics' inherent or added, imposed by the seller or manufacturer, but in general embedded in goods, giving rise to the commonly used term 'added value'. In consumer research, taking the axiological approach, value (singular) of the offering is regarded as a result of assessment or judgement of the offering conducted against the evaluative criteria in

terms of the fulfilment of values (plural form) such as 'rules, norms, goals, and ideals' (plural) (Holbrook, 1999). Holbrook's (1999) value concept emphasises value from the consumer's perspective, i.e., value in evaluative terms and with respect to motivational justification. The value of offerings is associated with their role in the fulfilment of consumer values (plural) in their individual phenomenological consumption experiences.

In terms of values (plural), it has been referred to as the explicit and disinterested moral knowledge, concepts and beliefs as guidelines in the public world that we can choose or decline (Dreyfus, 1993) and which can affect what the individual does and becomes (Weber, 1984/1909). However, it is argued that in the modern era, this type of values lose their authority on many individuals. Consequently, individuals turn to private experiences that entail meaning and significance to their lived lives (Dreyfus 1993; Heelas 1996; Berger, Berger and Kellner 1974). For example, Heidegger emphasised that the '*shared everyday skills, concerns and practices*' socialised by human beings enable them to understand the world and their lived lives by '*providing a background understanding of what matters and what it makes sense to do*' (Dreyfus 1993, p.296). The shared practices can give shared meanings to the people who practice it (Dreyfus 1993, p.297). The incorporated/embodied social skills or '*a kind of knowing how*' -- rather than the '*concept, beliefs and values*' or '*a kind of knowing-that*' -- give directions and meanings to individual lives (Dreyfus, 1993, p.293-294). These shared meanings are the *values* that consumers would aim to achieve in their consumption practices (Bourdieu, 1977; 1984).

Thus, the rules and norms and individuals' socialised skills and competence provide guidance for human actions in performing the social and cultural practices in their lived world. These actions could reproduce or realise social structure in their individual setting; fulfil the individual goals and projects and give meaning/values to his/her existence. These performances occur in the local environment, which is a 'relational totality' consisting of other things, other people and the person and the offering in action. Thus, we would suggest that the value of an offering lies in its role in the individual's performance of social and cultural practices through consumption activities carried out by individuals in their everyday lives and through their dynamic interactions with the environment. The local environment could entail emergence, improvisation and coordination. Consumer consumption experiences could be emergent and improvised, which is termed 'situated experiences'. 'Situated experiences' have been a concern in philosophy (Heidegger, 1996/1927), ecological psychology ('affordance', Gibson, 1979), and sociology (Blumer, 1962; Garfinkel, 1967).

These discussions of value reflect the 'goodness' of an offering in its use or in its role in consumer values/meanings in consumers' lived experiences, commonly labelled as 'use-value'. In contrast, exchange value is viewed as an offering's *worth* in exchange, where each party exchanges one kind of value for another (Bogozzi, 1975).

Value In Exchange And Role Of Marketing In Product Design And Innovation

In contrast to the definitions of value (s) discussed in the previous section, the proliferation of economic exchanges led to the focus of exchange value as a proxy for use-value. Exchange value is defined as goodness for exchange and the power of purchasing other goods (Smith 1776; Marshal 1927; Walras 1894/1954). Value-in-exchange is created when an offering is exchanged, usually in return for some monetary compensation, between a provider and a customer. Thus, exchange value of an offering rests in its exchangeability and is often manifested in monetary form. The provider's responsibility for the creation of exchange value usually ends upon the transfer of ownership of the goods when the 'exchangeable unit' produced is given away through transacting with the customer. The producer perceives its role as primarily making and selling products in the markets with the promise that they would meet consumers' expressed needs. The producer is actually less concerned about when, how and why the needs are met since they occur after the exchanges. This priority has been expressed through the definitions of marketing from the 1920s to 2000s (See Ringold and Weitz 2007). Indeed, marketing is primarily a 'seller subject' aiming to manage customers by creating, stimulating, facilitating and valuing offerings to increase (discrete) transactions (Kotler 1972) or by 'creating, delivering, and communicating super values' for forging enduring exchange relationships (Kotler and Keller 2006) to sustain the markets (e.g., Day 2000). The notion of value-in-exchange and the resultant marketing practices reflects the 'marketing to' philosophy, in which consumers are often 'exogenous' (Lusch 2007, p.265) to the product design, production and operation of the firm.

In traditional product innovation, marketing's contribution lies mainly in (1) understanding and selecting customers' needs (e.g., Soukhoroukova, Spann and Skiera 2012). The focus is more on the expressed needs at the aggregate level; (2) generating market knowledge about and finding solutions for customers' problems (Cooper and Kleinschmidt 1987; Atuahene-Gima and Wei 2011); (3) ideation (generate, validate, and refine ideas for new products and services) (e.g., Soukhoroukova, Spann and Skiera 2012); (4) translating ideas into product design, specifications and selecting the best design (e.g., Kim and Xirouchakis 2010; Li et al., 2012); (5) selecting new products which can be accepted by the targeted market (Thrassou et al. 2012; Zhang, Hu, and Kotabe 2011); and (6) determining the attractiveness of new products for customers (e.g. Noble and Kumar 2012).

In these activities, the consumer's role has often been confined to being an information source and/or recipient of information (Athaide and Stump 1999). Despite the importance of consumer interactivity and empowerment for innovation, consumers are used merely as 'external' sources and treated as subjects upon whom product attributes are sourced, tested, validated (e.g., Gyi, Cain and Campbell 2010). Indeed, consumers are often not involved in the creation of the product (e.g., Creusen 2011; Zakarian 2010). Even though marketing aims to seek specific desired responses or establish exchange relationships with consumers by creating and offering attractive values in the markets, the value of offerings are defined subjectively from the marketer's point of view (e.g., Child et al. 1995; Kotler and

Keller 2006). The consumer's role in the design and innovation process reflects the role of marketing under the notion of value-in-exchange: a set of techniques for the firm-centric product innovation process, which purportedly aims to respond to customers' usage needs but is actually more absorbed with achieving sales and adoption.

At the post-launch stage, marketing has played a role in enhancing customer acceptance of new products. The majority of current studies about customer acceptance of innovation are mainly located in the field of psychology by (1) employing the theory of planned behaviour (e.g., Planning and Britzelmaier 2011; Venkatesh, Thong and Xu 2012); (2) and focusing on psychological factors such as attitudes and perception of new product attributes and behavioural intentions (e.g., Wells, Kleshinski and Lau 2012; Talke and O'Connor 2011), mental resources (motivation, opportunity and ability) (Saaksjarvi and Samiee 2011), and schema incongruity of new products and consumer choice (e.g., Jhang, Jung and Campbell 2012). We argue that from the 'product' perspective, most marketing literature takes a product as a 'given'; the investigation is concentrated on consumer choice and buying behaviour.

Notions of value-in-exchange, exchange and transaction have affected the role of marketing in product design and innovation practices. However, technological advances can potentially enable a firm to serve the individual consumer needs by achieving value-in-use with consumers in their consumption contexts (Ng, 2013).

Value-In-Use And The Role Of Marketing In Product Design And Innovation

S-D logic has offered a perspective of value that recaptures the notion of value-in-use. Value can be derived from the participation of, and can be determined by, the consumer through their engagement in the process of acquisition, usage, and disposal of offerings in their contexts (Holbrook, 1987; Vargo and Lusch, 2004). Value, from an S-D logic perspective, is always value-in-use. S-D logic reflects the 'marketing-with' philosophy, which *'views the customer as endogenous and as a partner in the co-creation of value'* (Lusch 2007, p.265).

In marketing literature, S-D logic offers a view of value, which considers the role of both the offering and the consumer in value creation. The firm's offerings are not regarded as a promise of 'realised' value but as a bundle of resources, available to consumers for their values creation in their contexts. Value of the offering could only be realised through the integration of competencies from both the offering and the consumer for achieving the consumer's values regarding their goals and desired outcomes (Vargo and Lusch 2004; 2008). The S-D logic notion of value is congruent with structuration theory (Giddens, 1984) in that the resources and competencies embodied by the offerings can represent different levels of social structure and contexts (such as norms, rules etc). Consumers can use these offerings as resources to reproduce the social structure (Chandler and Vargo, 2011). We suggest that S-D logic privileges human agency in value creation.

Centred on the above understanding of value and values, this paper integrates the theory of practice, contexts, affordance, transaction to develop a research agenda for product design and innovation to serve contexts in the connected digital economy.

Theory of Practice

As discussed in the section of value/values, offerings are the crucial elements in consumers' performance of the social and cultural practices. Thus we introduce the theory of practice to illustrate how the offering and the consumer jointly achieve value-in-use to fulfil their goals and projects and give meanings/values for their existence in their consumption contexts.

At the individual level, practice is defined as '*a routinized way in which bodies are moved, objects are handled, [...] the world is understood*' that involves '*bodily and mental activities, things and their use, background knowledge and know-how, emotions and motivations*' (Reckwitz 2002, p.249). Such practice is also social and is defined as '*type of behaving and understanding that appears at different locales and at different points of time and is carried out by different body/minds; the social...*' (Reckwitz 2002, p.250). '*Both social order and individuality... results from practices*' (Schatzki 1996, p.13).

Practice is regarded as 'coordinated entity' and 'a 'temporally and spatially dispersed nexus of doings and sayings' (Schatzki 1996, p. 89). Practice refers to the doings and sayings with the linkages of (1) '*understanding of what to do and say...[]*' (2) '*explicit rules, instructions...[]*' (3) '*ends, projects, tasks, purposes, emotions...*' (Schatzki 1996, p. 89). These three elements must be analysed at both the practical activity level and also at their representations (Warde 2005).

Practice is also considered as performance. In order to perform practices well, Schatzki (1996) suggests that people have to understand what-to-say-and-do and 'knowing-how-to'-do something. Warde (2005) explains that '*knowing-how to-do something...[] a capability which presupposes a shared and collective practice involving performance in appropriate contexts and mastery of common understandings, which are the grounds for a particular act being recognizable as explaining*' (p.135). According to Schatzki (1996), 'knowing-how-to-do' entails explaining, which enables people to understand what needs to be explained and explain how to do. For Schatzki, explaining is a kind of '*ability to identify explaining when doing it oneself or when someone else does it, and an ability to prompt or respond to an explanation*' (Warde 2005, p135).

In marketing, we argue that offerings would represent consumers in terms of their routine practices by making sense of the doings and sayings. The doings and sayings entail (1) the social rules and principles; (2) explicit rules and instructions; and (3) the hierarchies of ends, tasks, projects regarding the routine practices. At the practical activity level, the value of offerings lies in their ability to support/facilitate consumers in producing and reproducing the practices appropriate for the contexts

through their entanglement in the environment with other people, other things and the consumer in the consumption contexts.

Context as a Unit of Analysis

Contexts are the key for understanding how offerings could be integrated in consumer routine activities to co-create value-in-use. In S-D logic, context is defined as *'a unique set of actors and the unique reciprocal links among them'* (Chandler and Vargo, 2011, p.41). Context could be conceptualised as multi-level and multi-layered links between *actors such as the consumer, products, other people and things* (at the micro-, meso-, and macro-levels). Thus contexts could frame the exchange of resources at various levels for value co-creation (reproduce various levels of social structures) and further to frame the markets (Chandler and Vargo, 2011). In contrast, from phenomenological approach (Dourish, 2004), contexts could also be regarded as *'an emergent property of occasions of interactions'* (Dourish, 2004, p.26). Contexts will arise from the interactions and actions, which is relevant and meaningful for the engaged actors in the local environment. Thus, in order to understand contexts, we need to explore the practices that are mutually recognised and engaged by the actors in the local environment. Practice requires mutual recognition and shared common sense understanding, based on which people can interact and create social order at the social and cultural level. Practice, as performance, requires actors (people and offerings) to have competencies and skills, the knowing-how-to do (Schatzki (1996).

From our review of literature, we suggest that there are three types of contexts: systemic, social and structural. At the individual level, the systemic context is referred to as 'flows', 'movements' and what makes a context dynamic and kinetic as a whole. It is where actual interactions between the customer and the offerings occur. It can be described as bodily activities (doings and sayings) (Schatzki 1996). Systemic contexts can be derived from situated experiences, which can be local, emergent and contingent. Systemic contexts can also be derived from individual routine practices. Thus, systemic contexts could be of an impossibly high variety. The variety of contexts could challenge the scalability of service (Madkour et al 2013; Badinelli et al 2012). Yet, as modern life evolves, research has suggested that there could be invariance across contexts even while individuals could be unique. Thus, the notion of a 'contextual archetype' has been proposed as a way to understand contextual varieties, i.e. clusters of systemic contexts that are similar (Ng 2013). These contextual archetypes are activity sets with some invariance across social contexts of lived lives, due to isomorphism and homogeneity of individuals in modern society (Strang and Meyer 1993). As individuals, we could therefore subscribe to similar collective activity sets. As an example, event level contextual archetypes could be 'a child and his parents conversing on Skype with grandparents once a week'. Contextual archetypes can be derived by identifying three components of a practice, including 'what to do' (sayings and doings), 'know-how' (rules and instructions), and tasks, purposes, emotions and motivation, which link the doings and sayings (Schatzki 1996) in clusters of systemic contexts. Offerings

could therefore be designed to represent contextual archetypes for the shared collective actions and also allow for personalisation of individual contexts.

Proposition 1-1: Insights in consumption contexts: Role of marketing is in representing customers by deriving contextual archetypes of product consumption in variety of contexts.

‘Social’ context can be referred to as ‘situations’ (Belk 1975) and ‘episodes’ (Buttle 1992) which emphasise time, location and occasions of consumption activities. In social contexts, consumers and offerings are associated with routine practices such as bodily activities and use of things with (1) the background knowledge of what to do and how to do (understanding) and ends, projects and motivations (Schatzki 1996; Reckwitz 2002), and (2) with their local and emergent systemic contexts. Variety of contexts across consumers’ routine consumption practices can be drawn upon to form the inter-subjectivity and the structural aspects of practice and to be abstracted to form principles, which we term the structural contexts. Principles can explain all cases in terms of individual practices and activities and generate practical schemas. These practical schemas are cognitive in nature and have generative functions, which can generate individual practices and activities, which in turn can reproduce principles (Bourdieu, 1977). Consumers could have embodied skills and competencies for conducting these practices (Bourdieu, 1984). These principles could provide the shared reference frame and cultural conventions for designers to develop offerings.

Proposition 1-2: Insights into consumption contexts: Role of marketing is in understanding contexts by abstracting the principles of value co-creating practices (including the systemic, social and structural aspects of contexts) embedded in consumer routine consumption practices and embodied in the interactions.

Proposition 1-3: Insights into consumption contexts: Role of marketing is in representing customers by embodying the competencies in the offerings for value creation in the process of facilitating and supporting consumers to perform the routine practices in their contexts.

It is important to note that the role of marketing in the propositions above serve not only to shift from a value-in-exchange mindset to that of value-in-experience. It also implies a more fundamental shift of marketing from the psychological profiling of customers, often necessary for buying behaviours, to sociological contextual archetypes necessary for understanding value-creating behaviours and the ensuing outcomes, particularly if the firm derives its revenues from such outcomes. Even if revenue streams do not come from outcomes, contextual consumption behaviours will still inform buying motivations. While the psychological makeup of consumers is still important, they are now embedded within the behaviour (including both the social and psychological aspects) and a focus on contexts enables a better understanding of the interactions between them.

In the past, data on consumers' real contexts would be impossible to obtain. However, with digital connectivity and sensor technologies, companies are now much more able to understand real value-creating behaviours and how they could relate to the psychological attributes of intentions, attitudes and beliefs.

Affordance and Dynamic Configurability

Offerings could embody the competencies and skills to engage in consumers' routine practices in contexts. Offerings entail affordance. Affordance refers to what something can *afford* (Gibson, 1979; 1982), involving the functional aspect of an object, including its 'enabling' and 'constraining' properties with respect to agent engagement in activities (Hutchby, 2001). Affordance provides a way to take into account of the materiality of objects and also the orientation of the users in the 'use-in-situated-social interaction' with objects (Hutchby 2003, p.584). The affordance concept entails a relational ontology. We hold the notion of the entanglement between the consumer and the offering in the consumption practices for value creation in their social contexts. In this process, the offerings, the consumer, other things, and other people interact and form a network to co-create value (Normann, 2001). Offerings could be tied up with other objects and people, and could also be tied in with complex sets of contexts. Therefore, we need to understand the affordances for the consumers' agentic actions in relation to all the other actors in the value-creating network in various contexts. Here, actors include both people and things in the network. Thus, design of offerings should focus not only on functions but also on the affordances (Maier and Fadel, 2009).

Affordances frame but do not determine the agentic actions in relation to the object (Hutchby 2001, p.444). Thus, objects have '*situationally defined properties...emerge in the context of encounters between actors and objects*' (Rappert 2003, p.574). An object's affordance also depends on a series of pre-requisite but often unstated shared agreement between *actors*, i.e., a mutual reference frame and 'some take-for-granted assumptions and cultural conventions' (Rappert, 2003, p.576). Thus, the design of offerings as affordances involves framing the possibilities for consumers' actions by relating the consumers to the offerings in their contexts. Moreover, in order to represent the reference frame, the offering as affordance needs to represent structural contexts (social rules, norms and principles) and social and systemic contexts within which such affordances could materialise.

Proposition 2-1: Dynamic reconfigurability: The role of marketing is to inform the design of affordances of offerings by understanding and enabling consumers' routine practices.

Understanding affordance allows us to understand what affordances an offering could materialise in a variety of contexts and in relation to other products. An offering can be designed to be more dynamically reconfigurable in order to fit in the diverse and dynamic interactions of actors in their contexts. Dynamic reconfigurability as a concept has been widely used in system design, which enable the system to '*have the capability to modify their functionalities, adding or removing*

components and modify interconnections between them' (Rana, Santambrogio and Sciuto 2007). With the development of pervasive digital technology, dynamic reconfigurability becomes possible in future products because products could have a '*reprogrammable nature*'. This means products could have new capabilities even after a product or tool has been designed, manufactured and sold (Yoo, Boland and Lyytinen 2012, p.1399). Thus, products may not need to be 'finished' to be transferred to the customer but could be designed such that contexts of use could be incorporated into a modular product design and 'finished' through customer resources brought into consumption through digital pervasive technologies. This 'incompleteness', resulting in open and flexible boundaries of products, allows offerings to materialise multiple affordances and dynamically alter their affordances with changing contexts.

Proposition 2-2: Dynamic reconfigurability: The role of marketing is to inform the design of multiple dynamic reconfigurable affordances of offerings in relation to consumers' routine practices.

An object's connective role is another aspect of its affordance. The affordance of the object can be attributed to it being the 'focal' element and to its ability to connect and enact other things for value creation. Thus, the product can become part of the 'environment', which entangles with other actors (objects and people) in terms of creating value and exchange meanings in the context. Other objects and people in the environment are only potential resources to create value, and they can become resources only in contexts when they are connected by the affordance and become part of the entanglement with the individual in his/her routine practices. Thus, the offering containing affordance elements could connect with other things to enable their involvement with the customer for value creation. More importantly, affordance elements can be used to connect other actors in new patterns to create new value or to change the way certain types of value are created (Normann 2001, p.107; Michel, Vargo and Lusch 2008, p. 154). Due to the emergent nature of contexts, contexts can adapt and evolve with continued negotiation and redefinition (Dourish, 2004). Therefore, in order to serve the contexts, i.e., to achieve the outcomes for the practices, the offerings have to allow adaptation in the occasioned interactions.

Proposition 2-3: Dynamic reconfigurability: The role of marketing is to inform the design of multiple and adaptive affordances of offerings in relation to routine practices in emergent, adaptive and evolving contexts.

Transaction Boundaries

As discussed earlier, value-in-use is created in a network involving (1) actors such as the offering, people, and other things in consumer contexts; (2) skills, information, and material embedded and/or embodied in these actors; and (3) interactions and transfers of skills, information and material between these actors for the completion of the consumer's task. In order to co-create value, we need to understand how the consumer's task can be divided into various modules consisting of actors equipped with competencies, information and material and how these modules work together

to perform the consumer's task in contexts. Thus, modules could be developed in both the producer's and the consumer's domains to match their tasks respectively. In modularity theory, a module consists of a group of elements and these elements could be highly *'interdependent on another' within a module*, but only *'minimally dependent on what happens in other modules'* (Baldwin and Clark, 2000, p.63). *'By definition, modules are separated from one another by thin crossing points -in Simon's (1962) terminology, they are 'near decomposable' (Baldwin, 2008, p.166).* Thus, producers could possibly design the modules to create a 'thin crossing point', i.e., a boundary between the modules (i.e. tasks) for both the consumer's and the producer's, by dividing skills and competencies. Individuals could modularise their practices as tasks for the design of thin crossing points, which allows for new resource integration to occur. The readiness of the individuals to modularise their practices is therefore an essential step towards their acceptance of a new offering in contexts, and in turn creating new exchanges/transactions that could lead to new markets.

Proposition 3-1: Transaction boundaries: The role of marketing is to propose transaction boundaries (thin crossing points) in consumers' value-creating practices.

Proposition 3-2: Transaction boundaries: The role of marketing is to enable the firm and consumers to co-modularise value-creating practices to create new resources/offerings (and their respective affordances) for new transaction boundaries for emergent needs.

We suggest that we can apply Baldwin's (2008) concept of 'task network' and 'transactions' to describe actors, interactions and locations and boundaries of transactions engaged in the value-creating network. For Baldwin (2008), transactions could be located in a task network involving the *'nods'* ('task-cum-agents') and *'links'* ('transfer of material, energy and information' between tasks and agents'). Transaction is defined as *'mutually agreed-upon transfers with compensation within the task network'* and *'serves to divide one set of tasks and others'* (Baldwin, 2008, p.156). Baldwin's (2008) conceptualisation of transaction is developed from a *'systems of production'* perspective. This perspective enables us to analyse the dependencies between agents (i.e., consumers and producers), which are matched according to their tasks and ability (p.163). In this system, the basic unit is 'tasks' carried out by the agent needed to produce goods and services and the agent needed to obtain desired goods and outcomes. The dependencies between agents are based on the assumption that the agents involved in the production system are characterised with physical and cognitive limitations and no agents have to conduct tasks beyond his or her ability (p.163). By introducing Aoki's (2001) concept of 'division of cognitive labour; *'the user and the producer... deeply knowledgeable in their own domains... little knowledge about the others...labour is divided between two domains... task-relevant hidden with each other...only a few, ...simple transfers of material... information needed ... passed between the domains... the overall network ...have a thin crossing point at juncture of the two sub networks'* (p.166). *At thin crossing points between modules, there are, by definition, fewer and simpler transfers than within modules* (p.166) and the dependencies of their tasks

and skills are relatively low and therefore the transaction costs are low (p.156). However, when transactions are located within modules, the dependencies of the tasks and skills are higher and opportunistic transaction costs are high. These locations of transactions can be described as transaction-free zones. Baldwin (2008) suggests that transaction locations are likely to be discovered at the module boundaries (thin crossing points) rather than within the module.

The value-creating context, as a unit of analysis jointly for both the consumer and the producer, creates an interesting challenge for modularity and product architecture. Modularisations create new thin crossing points where transaction costs are low (p.156) and also create opportunities for new boundaries where new transactions and markets can be created. For example, the use of a crib by a couple looking after a baby (as both integrate resources to achieve their outcomes) consist of tightly-coupled processes and practices, what Baldwin terms a 'transaction-free zone' since transaction costs are high within it. Yet, novel ways to modularise creates opportunities for new offerings just as the couple would modularise their own value-creating practice to accommodate a nanny and her service in their value-creating network. The new ways of modularisation create transaction boundaries with 'thin crossing points' and low transaction costs. The marketing-operational research interface in modularisation and modularity needs to be mentioned here. Previous operations management (OM) literature have discussed modularity as "*the scheme by which interfaces shared among components in a given product architecture are standardised and specified to allow for greater reusability and commonality sharing of components among product families*" (p. 234, Voss and Hsuan, 2011). Thus, in the same way that modularity in past OM literature leads to opportunities to outsource modular components, modularity in value-creating practice leads to ways where latent needs could be fulfilled through new offerings. This implies that future OM and marketing collaboration is necessary to not only modularise for efficiency and scalability, both for the firm and the customer to co-create value more effectively, but is also essential for the possibility of new boundaries created within for new offerings to enter and lend resources to the value-creating practice, thus generating new markets.

Proposition 3-3: Transaction boundaries: the role of marketing is to inform the new module boundaries within a product architecture to create new transactions/revenue streams.

Standardisation and Personalisation

Since consumers' systemic contexts can be of high variety, an offering tailored for multiple contexts may be too heterogeneous and consequently, it is too costly for the firm to serve. Indeed, firms have always preferred to create standardised products since scale economies are often associated with mass production. However, in order to serve the contexts, marketing would contribute less to the firm 'being profitable'. There is a clear tension between production efficiency (and therefore profitability) and serving customers more effectively (and therefore higher in variety and costly). Instead, the standard rejoinder to achieving some scale

efficiency is to break down the market to segments of customers. The downside of such a model is the loss of potential customers, revenue and profits; the rigidity of pre-specifying customer requirements for the purpose of internal efficiency means the firm is not able to adapt and respond to changes at the customer usage end when contexts of use, even for the same person, could change. With new technologies, a new boundary can be created to distinguish between the configuration of resources available to absorb the variety and allow for personalisation and the configuration of resources put in place for standardisation. For example, the iPhone is fully standardised and enjoys economies of scale yet is able to be fully personalised, because of the boundary between the digital 'app' layer and the material 'phone' layer.

When objects begin to integrate with more pervasive digital technologies, firms would have more opportunities to develop product architecture with module boundaries aligned to transaction boundaries, allowing for both standardisation as well as personalisation.

Proposition 3-4: Transaction boundaries: The role of marketing is to inform new module boundaries to allow for both consumer personalisation and product standardisation.

Modularity and transaction boundaries do not merely occur within a product or an offering, but within the contextual archetypes as well. When the offerings from several vertical industries come together in the value-creating practices of individuals, the connectivity could result in a reconfiguration of value creation, laying open opportunities for new transactions across the verticals i.e. within the horizontal value-creating network. In marketing, for decades, the appetite for aggressive (and largely independent) Competitive Advantage has emphasised the vertical integration and connections. The notion of Collaborative Advantage and innovation has emerged - reflecting the awareness (promoted by a gradual appreciation of greater connectedness) of the limitations of stand-alone 'vertical' propositions. Indeed, 'collaborative innovation' emphasises 'exploring the opportunities outside the current domain' (Ketchen, Ireland, and Snow, 2007, p. 371) by investigating the task-network to design the modules across domains and create new thin crossing points between the modules and thus new transactions could be designed.

Distributing Competencies

In order to serve contexts, the firm's offerings need to embody the know-hows required for performing social practices in contexts. The know-hows embodied in these offerings can involve a variety of knowledge and competencies, which also entails a variety of know-hows required from the customer in their joint value co-creating practices. It is suggested that offerings could be reconfigurable, which would allow the customer to integrate more or fewer skills and competencies as necessary for value co-creation (Michel, Brown and Gallan 2008, p.56).

Proposition 4-1: Distributing competencies: The role of marketing is to inform the understanding of the competencies of various value-creating actors in the contexts.

In order to realise the value-in-use and fulfil consumer values, it is key to achieve the optimal combination of competencies and skills embodied in both the offering and in the customer and other resources available in the environment in contexts (Normann 2001). In order to attain these combinations, it is crucial to understand what is the appropriate delegation and distribution of competencies and skills between the offering and the individual for value creation in contexts. It is also important to identify what practices would connect which actor (the offering, other objects, people) to achieve what outcomes in contexts. Indeed, different delegation and distribution of competencies between the offering and the customer can bring about different offerings, connect different actors and create different values (and therefore revenues), resulting in different experiences. For example, when the mobile phone had no memory storage, a call would require individuals to remember the number, or have their notebooks in hand to achieve the desired outcome. The experience of a phone call with mobile phone-with-memory-storage is therefore different from the experience of a phone call with mobile phone-notebook-handling-three-things-with-two-hands. Clearly, the competency of an offering and the individual will dictate the actors that would play a role within the contextual archetype e.g. the notebook is an additional actor if the phone has no memory storage.

To obtain an understanding of value creation in contexts and the competencies of actors within them, we propose a socio-material ontological view which does not privilege human agency or material performativity but which views that material performativity and human agencies are associated with one another (*'human agency is always materially performed, just as material performances are always enacted by human agency'*, Orlikowski, 2005, p.185). This view focuses on 'constitutive entanglement (e.g., configurations, networks, associations, mangles, assemblages, etc) of human and technology' (Orlikowski 2009; Pickering 2008). The relational ontology would enable us to overcome the 'passive' view of offerings in value-creating actions and to emphasise both human agency and material performativity in enacting the value creation processes. This notion allows us to harness the material performativity delegated to act for humans and to consider human intentionality in practice (Pickering 2008; Orlikowski 2009). Thus, it can be suggested that both customers and offering/firms can be represented in these new forms of innovation.

Proposition 4-2: Distributing competencies: The role of marketing is to inform the design of multiple affordances and dynamic reconfigurability ('smart' offerings) by delegating and distributing the competencies for routine practices between the actors in the contextual archetype.

We view that the firm's offerings and consumers co-create values in a socio-material entanglement such as networks that include not only the offerings and the consumers but also other things and other people in the consumers' lived lives. Thus, it can be argued that the compensation for the offering (i.e. the transaction)

might not be based on its own goodness or ownership but on its role in value creation within the entanglement, through a new transaction boundary (Ng, 2013). Thus, when an offering engages in the value co-creation with a customer, due to the entanglement with other things in the environment, the offering can be associated with the verticals of other things in the horizontal systemic context. This implies that revenue of the offering could be derived from connecting other vertical channels (of other things) because they are engaged in the same value-creating context.

Proposition 4-3: Distributing competencies: The role of marketing is in the identification of transaction opportunities in contexts (1) by understanding the competencies of each actor; (2) by exploring the combined competencies from potential connectedness between actors; (3) and the business model collaboration between the verticals as actors in the horizontal network.

The following table summarises the discussion above

Role of marketing in the design and innovation of future products in the connected digital economy	Specific propositions
Insights into consumption contexts	<i>Deriving contextual archetypes of product consumption in variety of contexts.</i>
	<i>Abstracting the principles of value co-creating practices (including the systemic, social and structural aspects of contexts) embedded in consumer routine consumption practices and embodied in the interactions.</i>
	<i>Embodying the competencies in the offerings for value creation in the process of facilitating and supporting consumers to perform the routine practices in their contexts.</i>
Dynamic reconfigurability	<i>Inform the design of affordances of offerings by understanding and enabling consumers' routine practices</i>
	<i>Inform the design of multiple dynamic reconfigurable affordances of offerings in relation to consumers' routine practices.</i>
	<i>Inform the design of multiple and adaptive affordances of offerings in relation to routine practices in emergent, adaptive and evolving contexts.</i>
Transaction boundaries	<i>Propose transaction boundaries (thin crossing points) in consumers' value-creating practices.</i>
	<i>Enable the firm and consumers to co-</i>

	<i>modularise value-creating practices to create new resources/offerings (and their respective affordances) for new transaction boundaries for emergent needs.</i>
	<i>Inform new module boundaries to allow for both consumer personalisation and product standardisation.</i>
Distributing competencies	<i>Inform the understanding of the competencies of various value-creating actors in the contexts.</i>
	<i>Inform the design of multiple affordances and dynamic reconfigurability by delegating and distributing the competencies for routine practices between the actors in the contextual archetype.</i>
	<i>The identification of transaction opportunities in contexts (1) by understanding the competencies of each actor; (2) by exploring the combined competencies from potential connectedness between actors; (3) and the business model collaboration between the verticals as actors in the horizontal network.</i>

Discussion and conclusion

For decades, marketing has played an important role in product design and innovation in terms of obtaining consumer insights, providing feedback and testing new products. However, in traditional marketing planning and management concepts, consumers are often used as exogenous resources that firms can draw upon and are frequently treated as subjects on whom ideas can be sourced, tested and validated. We argue that marketing does not have a clear framework on how customers could be represented within new product design and innovation, especially for emergent needs.

Our paper argues that in the connected digital economy, it is urgent for the marketing community to shift to a paradigm in which value-in-use is central, since market inefficiencies exist for consumers when they have to buy products out of contexts of use. This new paradigm would focus the discipline on designing incomplete products and meeting emergent/latent needs. In addition, technology, in particular pervasive digital technology, has greatly enhanced the connectivity between people, things and information, and improved the visibility of customers' consumption contexts, especially with the advent of the Internet-of-Things. To create market opportunities from technological development, marketing could shift

to understanding contexts of consumption (Ng 2013). In order to serve contexts, firms have to understand the customer's consumption contexts in terms of value-creating resources, processes or practices in a dynamic manner and then represent the firm within it so that outcomes could be achieved. The potential role of marketing in serving the context proposed in this paper will contribute to the design of future connected products, which will be functionally, culturally and socially meaningful for consumers.

Our paper proposes a relational ontology, from which offerings are not treated as mere means being acted upon by human agents for achieving the ends (consumers' value-in-use and outcomes) but as part of the 'socio-material' assemblage between consumers and offerings entangled within routine practices having their material performativity. Indeed, in the value creation, consumers interpret, react to the material performativity of offerings and also consider their competencies and skills required in terms of their understanding and explanation to perform the routine practices. The competencies and skills embodied in the offering and in the customer need to work together to create the values for the customer in their contexts.

We hold the notion that the design of future offerings could centre on supporting and facilitating the customer's lived lives by serving contexts. Our paper suggests four main contributions of marketing in the design and innovation of future products.

First, marketing could contribute to gaining insights into contexts to enable firms to engage in the achievement of consumer value-in-use. Moreover, with technological advancement, marketing would contribute to the understanding of real-time value-creating behaviours and how they could relate to emotions, attitudes, perception and beliefs in contexts. Thus, firms could obtain a full profile of the customer, which could enable the company to develop real relationships with the customer by engaging in meaningful and personal interactions with them in their lived lives. This is what relationship marketing intends to achieve.

Second, future offerings would not only represent but also entwine in the consumption practices. Moreover, technological advances enable us to design dynamically reconfigurable offerings to materialise the potential possibilities of the offerings for value creation in the form of 'incomplete' products. This 'incompleteness', resulting in open and flexible boundaries of products, allows offerings to materialise multiple affordances and dynamically modify its affordances with changing contexts. Third, marketing would contribute to the design and the explanation of the location of transactions and transaction boundaries. This can be achieved by jointly analysing the value-creating practices and related (task) network, and developing the modules and the thin crossing points to create transactions with lower costs. With the understanding of the transaction boundaries and the possibility of dynamic re-configurability and flexible boundaries of products, different modules can be designed to fit with customers with different needs for skills, information, material etc. Fourth, marketing could contribute to achieving possible ideal integration of consumers' agency and material performativity for

performing the practices by understanding, delegating and distributing the competencies between the actors in the value network in consumer contexts.

Studying the role of marketing in product design and innovation in the connected economy is important because it could result in new business models that are use-outcome-driven, and generate opportunities for new offerings and new markets, be they tangible goods or services (Zott and Amit 2010). Current markets, a legacy of the industrial era, are still mainly exchange-driven. We argue that markets created from use and outcomes will increasingly be possible with the advancement of technology. These new markets will drive the future of the economy.

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